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T-2377

Job No.: CTCE/BBMP/WNo.13/KRIDL/CSR-04/009d/QB(BM)/2016-17 11.04.2016

TEST REPORT ON DETERMINATION OF BITUMEN CHARACTERISTICS

CLIENT	:	**Asst. Executive Engineer,** Shettyhalli Sub Division, BBMP, Bangalore.
AGENCY	:	**Technical Manager (West),** KRIDL, PIU, Bangalore.
NAME OF THE WORK	:	Improvements and Asphalting to BHEL Mini Colony main road and Huccharangaiah House Road in Mallasandra in Ward No. 13, Shettyhalli Sub Division , BBMP, Bangalore.
REFERENCE	:	EE/DD/WO/ /2015-16
SAMPLE ID	:	Bituminous Macadam
DATE OF TESTING	:	11.04.2016

The results of the tests conducted on the bitumen sample.

Sl. No	Description	Test Method as per IS	Test Result	Requirement as per IS:73:2013
1	Penetration at 25 ^{0}C, 1/10 mm	IS :1203 -1978 (RA-2009)	86	80 to 100
2	Softening point, ^{0}C	IS :1205 -1978 (RA-2009)	46	Min. 40
3	Ductility at 27^{0}C, cm	IS :1208 -1978 (RA-2009)	100 >	Min. 75
4	Flash Point, ^{0}C	IS :1209 -1978 (RA-2009)	287	Min. 220

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Job No: CTCE/BBMP/WNo.13/KRIDL/BM/Sp_Wa/2016-17 12.04.2016

Specific Gravity And Water Absorption Test

IS: 2386 Part III

Client	**Asst. Executive Engineer,** Shettyhalli Sub Division, BBMP, Bangalore.
Agency	**Technical Manager (West),** KRIDL, Bangalore.
Name of the Work	Improvements and Asphalting to BHEL Mini Colony main road and Huccharangaiah House Road in Mallasandra in Ward No. 13, Shettyhalli Sub Division, BBMP, Bangalore.
Reference	EE/DD/WO/ /2015-16
Source / Location	Hotmix Plant, Bangalore.
Type of Mix	Bituminous Macadam
Date of Testing	12.04.2016

Sl. No.	Details	Notation	Test Number			Mean Value
			Test 1	Test 2	Test 2	
1	Weight of aggregate suspended in water with the basket	W_1 g	2013	2014	2016	
2	Weight of basket suspended in water	W_2 g	750	750	750	
3	Weight of saturated aggregate in water	$(W_1 - W_2) = W_s$ g	1263	1264	1266	
4	Weight of saturated surface dry aggregate in air	W_3 g	2026	2025	2026	
5	Weight of water equal to the volume of the aggregate	$(W_3 - W_S)$ g	763	761	760	
6	Weight of oven dried aggregate	W_4 g	2008	2010	2013	
7	Specific Gravity	$W_4/(W_3-W_S)$	2.632	2.641	2.649	2.640
8	Apparent Specific gravity	$W_4/(W_4-W_S)$	2.695	2.694	2.695	2.695
9	Water Absorption	$((W_3-W_4)*100)/W_4$	0.90%	0.75%	0.65%	0.77%

Comments:

→ Maximum allowable Aggregate Water absorption value for Bituminous Macadam is 2.0%

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Job No.: CTCE/BBMP/WNo.13/KRIDL/BM/Bitumen/2016-17 12.04.2016

GRADATION DETERMINATION OF BITUMINOUS MACADAM MIX

As per IS2386 and IRC:SP:11-1984

CUSTOMER	**Asst. Executive Engineer,** Shettyhalli Sub Division, BBMP, Bangalore.
AGENCY	**Technical Manager (West),** KRIDL, Bangalore.
NAME OF THE WORK	Improvements and Asphalting to BHEL Mini Colony main road and Huccharangaiah House Road in Mallasandra in Ward No. 13, Shettyhalli Sub Division , BBMP, Bangalore.
REFERENCE	EE/DD/WO/ /2015-16
SAMPLE I/D	BHEL Mini Colony main road and Huccharangaiah House Road in Mallasandra in Ward No. 13
DATE OF TESTING	12.04.2016

GRADATION AFTER EXTRACTION

Sieve Size in mm	Trail 1				Specified Limits as per MORTH specification table 500-04 (Grading-2)
	Weight Retained, gm	% Retained	%Cummulative Retained	% Passing	
26.5	0	0	0	100	100
19	36.43	7.65	7.65	92.35	90-100
13.2	92.56	19.45	27.10	72.90	56-88
4.75	264.53	55.57	82.67	17.33	16-36
2.36	15.89	3.34	86.01	13.99	4-19
0.3	32.16	6.76	92.77	7.23	2-10
0.075	15.98	3.36	96.12	3.88	0-8

Þ The results indicated above are based on the tests carried	Trail 2				Specified Limits as per MORTH specification table 500-04 (Grading-2)
	Weight Retained, gm	% Retained	%Cummulative Retained	% Passing	
26.5	0	0	0	100	100
19	33.12	7.00	7.00	93.00	90-100
13.2	83.46	17.64	24.65	75.35	56-88
4.75	260.42	55.06	79.70	20.30	16-36
2.36	46.79	9.89	89.60	10.40	4-19
0.3	25.61	5.41	95.01	4.99	2-10
0.075	8.45	1.79	96.80	3.20	0-8

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Job No: CTCE/BBMP/WNo.13/KRIDL/BM/Agg.G/2016-17 12.04.2016

Aggregate Gradation Test
IS : 2386 Part I

Client	**Asst. Executive Engineer,** Shettyhalli Sub Division, BBMP, Bangalore.
Agency	**Technical Manager (West),** KRIDL, Bangalore.
Name of the work	Improvements and Asphalting to BHEL Mini Colony main road and Huccharangaiah House Road in Mallasandra in Ward No. 13, Shettyhalli Sub Division , BBMP, Bangalore.
Reference	EE/DD/WO/ /2015-16
Sample ID	Hotmix Plant, Bangalore.
Type of Mix	Bituminous Macadam
Date of Testing	12.04.2016

Total Weight of Sample: 5300 gm

SIEVE SIZE, mm	Weight Retained, gm	% Retained	Cummulative % Retained	% Passing	Grade-II As per MORTH	Remarks
26.5	0	0	0	100	100	Gradation satisfies Grade-II MORTH specification
19	381	7.19	7.19	92.81	90-100	
13.2	1652	31.17	38.36	61.64	56-88	
4.75	1642	30.98	69.34	30.66	16-36	
2.36	1036	19.55	88.89	11.11	4-19	
0.3	246	4.64	93.53	6.47	2-10	
0.075	123	2.32	95.85	4.15	0-8	

Total Weight of Sample: 5450 gm

SIEVE SIZE, mm	Weight Retained, gm	% Retained	Cummulative % Retained	% Passing	Grade-II As per MORTH	Remarks
26.5	0	0	0	100	100	Gradation satisfies Grade-II MORTH specification
19	423	7.76	7.76	92.24	90-100	
13.2	1563	28.68	36.44	63.56	56-88	
4.75	1852	33.98	70.42	29.58	16-36	
2.36	981	18.00	88.42	11.58	4-19	
0.3	263	4.83	93.25	6.75	2-10	
0.075	90	1.65	94.90	5.10	0-8	

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Job No.: CTCE/BBMP/Wno.15/KRIDL/SDBC/Bitumen/2016-17

13.04.2016

GRADATION DETERMINATION OF SEMI DENSE BITUMINOUS CONCRETE MIX

As per IS : 2386 and IRC : SP : 11 - 1984

CLIENT	**Asst. Executive Engineer,** Shettyhalli Sub Division, BBMP, Bangalore.
AGENCY	**Technical Manager (West),** KRIDL, Bangalore.
NAME OF THE WORK	Improvements and Asphalting to BHEL Mini Colony main road and Huccharangaiah House Road in Mallasandra in Ward No. 13, Shettyhalli Sub Division , BBMP, Bangalore.
REFERENCE	EE/DD/WO/ /2015-16
SAMPLE I/D	BHEL Mini Colony main road and Huccharangaiah House Road in Mallasandra in Ward No. 13
DATE OF TESTING	13.04.2016

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GRADATION AFTER EXTRACTION

Sieve Size in mm	Trail 1				Specified Limits as per MORTH specification table 500-15 (Grading-2)
	Weight Retained, gm	% Retained	476	473	
13.2	0	0	0	100	100
9.5	26.36	5.54	5.54	94.46	90-100
4.75	251.45	52.83	58.36	41.64	35-51
2.36	53.78	11.30	69.66	30.34	24-39
1.18	52.89	11.11	80.77	19.23	15-30
0.3	28.96	6.08	86.86	13.14	9-19
0.075	35.89	7.54	94.40	5.60	3-8

Sieve Size in mm	Trail 2				Specified Limits as per MORTH specification table 500-15 (Grading-2)
	Weight Retained, gm	% Retained	%Cummulative Retained	% Passing	
13.2	0	0	0	100	100
9.5	34.56	7.31	7.31	92.69	90-100
********	258.89	54.73	62.04	37.96	35-51
2.36	54.85	11.60	73.64	26.36	24-39
1.18	43.42	9.18	82.82	17.18	15-30
0.3	26	5.50	88.31	11.69	9-19
0.075	34.12	7.21	95.53	4.47	3-8

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Job No.: CTCE/BBMP/WNo.13/KRIDL/SDBC/AGG/2016-17 13.04.2016

Aggregate Gradation Test

IS : 2386 Part I

Client	**Asst. Executive Engineer,** Shettyhalli Sub Division, BBMP, Bangalore.
Agency	**Technical Manager (West),** KRIDL, Bangalore.
Name of the Work	Improvements and Asphalting to BHEL Mini Colony main road and Huccharangaiah House Road in Mallasandra in Ward No. 13, Shettyhalli Sub Division , BBMP, Bangalore.
Reference	EE/DD/WO/ /2015-16
Sample I / D	Hot Mix Plant, Bangalore
Type of Mix	Semi Dense Bituminous Concrete (SDBC)
Date of Testing	13.04.2016

Total Weight of Sample: **5100** gm

SIEVE SIZE, mm	Weight Retained, gm	% Retained	Cummulative % Retained	% Passing	Grade-II As per MORTH	Remarks
13.2	0	0.0	0	100	100	Gradation satisfies Grade-II MORTH specification
9.5	392	7.7	7.69	92.31	90-100	
4.75	2653	52.0	59.71	40.29	35-51	
2.36	712	14.0	73.67	26.33	24-39	
1.18	510	10.0	83.67	16.33	15-30	
0.3	312	6.1	89.78	10.22	9-19	
0.075	251	4.9	94.71	5.29	3-8	

Total Weight of Sample: **5250** gm

SIEVE SIZE, mm	Weight Retained, gm	% Retained	Cummulative % Retained	% Passing	Grade-II As per MORTH	Remarks
13.2	0	0.0	0	100	100	Gradation satisfies Grade-II MORTH specification
9.5	258	4.9	4.91	95.09	90-100	
4.75	2563	48.8	53.73	46.27	35-51	
2.36	836	15.9	69.66	30.34	24-39	
1.18	512	9.8	79.41	20.59	15-30	
0.3	349	6.6	86.06	13.94	9-19	
0.075	412	7.8	93.90	6.10	3-8	

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Job No.: CTCE/BBMP/WNo.13/KRIDL/SDBC/Stability/2016-17 13.04.2016

TEST REPORT ON STABILITY OF MIX

Client	:	**Asst. Executive Engineer,** Shettyhalli Sub Division, BBMP, Bangalore.
Agency	:	**Technical Manager (West),** KRIDL, Bangalore.
Name of the work	:	Improvements and Asphalting to BHEL Mini Colony main road and Huccharangaiah House Road in Mallasandra in Ward No. 13, Shettyhalli Sub Division , BBMP, Bangalore.
Reference	:	EE/DD/WO/ /2015-16
Source of location	:	Hot mix Plant, Bangalore
Type of Mix	:	Semi Dense Bituminous Concrete
Date of Testing	:	13.04.2016

The results of the tests conducted on the bituminous mix sample are as follows:

Sl. No	Description	Test Result 1	Test Result 2	Requirement as per MORTH (Table 500-16)
1	Marshal Stability, at 60° C, Kn	8.60	9.10	8.2 Kn (min)
2	Marshal flow at 60° C, mm	2.50	2.60	2 – 4
3	Percent air voids	3.18	4.60	3 – 5
4	Percent voids in mineral aggregates (VMA %)	14.80	14.25	13 - 15
5	Percent voids filled with Bitumen (VFB %)	72.45	73.20	65 – 78
6	Density, g/cc	2.26	2.25	---

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